REMARKS

By this Amendment claims 1-6 have been amended to better define the invention and claim 7 has been amended as requested by the examiner. Entry is in order.

The examiner will find attached hereto a supplemental page 10 for the application containing an abstract of the disclosure.

In the outstanding Office Action the examiner has rejected claims 1-4 under 35 U.S.C. 102(e) as being anticipated by Ribic.

This rejection is incorrect.

Ribic discloses a method and apparatus for picking up sound, the method including providing at least two essentially omni-directional microphones (1a, 1b, 1c) or membranes (9a, 9b) which have a mutual distance (d) shorter than a typical wave length of the sound wave; combining these microphones (1a, 1b, 1c) or membranes (9a, 9b) to obtain directional signals (F(t), R(t)) depending on the direction (3) of sound; and processing the directional signals (F(t), R(t)) to modify the directional pattern of the signals.

However, Ribic does not disclose the presently claimed invention. In this regard, Ribic does not mention the setting of fixed directivity patterns which are set for optimized directivity when the microphone system is located near or at an object. In the passage (col. 6, lines 20-42) referred to by the examiner, a system comprising 3 microphones and adapted for higher order directivity is described. Nothing in this passage

points towards setting the backward or forward directivity patterns for optimized directivity when the microphone system is located near or at an object. Figures 8, 9 and 10 disclose simulations of the directivity obtained in free field. This points away from the invention. The invention defined in claim 1 thus is new over Ribic.

With respect to claim 2, Ribic does not disclose optimizing the forward and the backward pointing directivity patterns when the microphone is located near or at the hearing aid users head.

Ribic may teach processing of the microphone signals in frequency bands, and directivity patterns set to ensure highest ratio between sound coming from in front of the hearing aid user and unwanted sound coming from behind, however none of this is taught in combination with setting the backward or forward directivity patterns for optimized directivity when the microphone system is located near or at an object. Thus claims 3 and 4 are new and inventive over Ribic.

The examiner's anticipation rejection based on Ribic must be withdrawn.

The examiner has rejected claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Cezanne et al.

This rejection is incorrect.

Cezanne et al. disclose a method of enhancing the signal-to-noise ratio of a microphone array. However, Cezanne et al. do not suggest the

presently claimed invention. In column 5, line 65 of Cezanne et al. it is explained how the resulting output signal is generated:

$$Y(n) = C_F(n) - \beta C_B(n)$$ (equation 5 in the specification)

The $C_F(t)$ and the $C_B(t)$ forward and backward cardioid are generated as explained on page 4, lines 56-64 in simple delay and subtraction algorithms working on the microphone signals: "The delay lines 30, 25 introduce signal delays needed to form the cardioid sensors of the embodiment. Subtraction circuit 40 forms the bak cardioid output signal $C_B(t)$, by subtracting a delayed output of microphone 12 from an undelayed output of microphone 10. Subtraction circuit 45 forms the front cardioid signal $C_F(n)$, by subtracting a delayed output of microphone 10 from an undelayed output of microphone 12."

In this simple delay and sum algorithm there is nothing which could lead the person of ordinary skill towards an optimization of the forward and backward cardioid with respect to a nearby object. There is also nothing in Cezanne et al. which points towards any other method of generating the forward and backward cardioid. And further, there is no indication which could lead the person of ordinary skill towards a hearing aid wherein the forward and backward cardioids are set for optimized directivity when the microphone system is located at or near an object.

The general outline of the system presented in Cezanne et al. is given col. 1, lines 56-60, col. 2, lines 2-8 and col. 3, lines 66-67 through col. 3, lines 1-4, and the examiner points at these parts of the document in the argument that this describes the novelty of the present invention. This is not correct.

The first passage reads as follows: These one or more parameters (the ß values) are evaluated under the constraint to realize the desired orientation. The output signals of one or more microphones of the array are modified based on these to evaluated parameters and the modified output signals are used in forming an array output signal.

An illustrative embodiment of the invention includes an array having a plurality of microphones. The directivity pattern of the array (i.e., the angular sensitivity of the array) may be adjusted by varying one or more parameters (the ß values). According to the embodiment, the signal-to-noise ratio of the array is enhanced by evaluating the one or more parameters (the ß values) which correspond to advantageous angular orientations of one or more directivity pattern nulls. The advantageous orientations comprise a substantial alignment of the nulls with sources of noise to reduce microphone array output signal level due to noise. The evaluation of parameters (the ß values) is performed under a constraint that the orientation of the nulls be restricted to a predetermined angular region of space termed the background.

The parentheses in the above passage have been added. From the above passage and the equation 5 above it is clear that ß values are used to direct the directivity pattern null in the direction of a noise source within a predetermined region. The forward and backward cardioids are not changed, they remain fixed.

The second passage reads as follows: In the context of the present invention, there is no requirement that desired sources be located in the foreground or that undesired sources be located in the background. For example, as stated above the present invention has applicability to situations where desired acoustic energy impinges upon the array from any direction within the foreground region (regardless of the location of the desired source(s)) and where undesired acoustic energy impinges on the array from any direction within the background region (regardless of the location of the undesired source(s)). Such situations may be caused by, e.g., reflections of acoustic energy (for example, a noise source not itself in the background may radiate acoustic energy which, due to reflection, impinges upon the array from some direction within the background).

In this passage it is discussed how the directivity null may be adjusted to any region, be it in front or behind the array. There is nothing in this which could lead a person of ordinary skill towards a method as defined in independent claim 1.

Also the method for adjusting the directional response of a microphone system as claimed in revised independent claim 5 is new and inventive over Cezanne et al., as it is nowhere herein described or suggested that a directional response is achieved by adjusting a delay between the microphone signals and subtracting or adding the signals in order to achieve the highest possible ratio between sound coming from a preferred direction of the microphone system and unwanted sounds coming from other directions while the microphone system is placed at or near the object where the system is to function. Thus, the method for adjusting the directional response of a microphone system as claimed in amended claim 5 is novel over Cezanne et al.

Amended claim 6 limits the system to two omni-directional microphones. There is no indication in Cezanne et al. which could lead a person of ordinary skill to the use of such microphones in the method of claim 5. Thus, claim 6 is allowable.

Also claim 7 is dependent on claim 5 and the limitation of this claim in combination with the contents of claim 5 defines a new and patentable invention.

An Abstract on a separate sheet was submitted with the Preliminary Amendment filed June 16, 2005.

Favorable reevaluation of this application is requested.

Respectfully submitted,

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